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Uhrincat, M., Tancin, V., Kovalcikova, M., Broucek, J. & Mihina, S. (Slovakia) The distance of breast-fence arms and manger bottom height - requirements of various age categories of heiferes

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ABSTRACTS

INVITED REVIEW PAPERS

BEHAVIOUR, HOUSING AND WELFARE OF FARM ANIMALS: COSTS AND BENEFITS

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It has been increasingly recognised in recent years that an understanding of the behaviour of farm animals is important for many aspects of production (for example, reliable detection of oestrus in dairy cattle, arrangement of efficient handling facilities and design of feeders which minimise spillage of food). Study of behaviour is also important in assessing animal welfare, for two main reasons. First, there are welfare problems associated with behaviour itself: restriction of certain behaviour patterns (such as nesting in hens and sows) causes frustration and the presence of others (aggression, cannibalism) is harmful. Second, behaviour can be symptomatic of other problems, such as disease. In many cases production and welfare are related; thus reduction of aggression and cannibalism is important both for economic and humanitarian reasons.

However, in other cases study of behaviour indicates that improvements in production bring disadvantages for welfare

(for example, increased growth rate of broilers and pigs has led to hunger of broiler breeders and sows under food restriction). Perhaps the most important difference between a production viewpoint and a welfare viewpoint is that the former concentrates on the group of animals whereas the latter emphasises the individual (thus increasing stocking density often decreases growth rate o f individual pigs but increases the profit from the pig farm). The cost of improving welfare can in some cases be partially offset by increased income from specialist products (free range meat, free range eggs), but the market for these is limited, and more so in some countries than others. Overall the balance between the priorities of production and welfare will be determined by interactions between economics and legislation.

Economics can therefore not be divorced from environmental design, which suggests that cost-benefit analysis will be increasingly important. It is limited by lack of a common currency between response and cost, and therefore can not produce quantitative decisions on environmental design. However, it can provide the framework for relevant factors to be identified and considered in a structured way. This argues that in the future we will need to know much more about the very complex relationships b etween environmental design, behaviour and welfare.

DO ABNORMAL BEHAVIOURS OF CAPTIVE BIRDS REFLECT SPECIFIC DEFICITS IN FORAGING?

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Foraging in any species consists of a series of appetitive and consumatory processes, and Hogan (1971) showed that integration of these in young chicks depends on experience of post-ingestional consequences. In other work with chicks, Sterritt and Smith (1965) concluded that feedback from pecking and from delivery of food into the crop are both reinforcing, but only in interaction with each other. In seems possible that all components of foraging, including walking, ground scratching and oro-pharyngneal stimulation, may represent separate potential sources of reinforcement. In natural environments, where foraging may take up much time, levels at which different components are expressed presumably depend on factors such as diet, food availability, nutrient density etc. However, in captivity some components are likely to be suppressed relative to these levels, because of confinement, free access to concentrated food, or chronic food restriction. It is suggested that under these conditions, compon ents of foraging that are suppressed are likely to be expressed in

apparently inappropriate ways, but in appropriate contexts, in response to specific deficits in reinforcement. This assumes a homeostatic basis to reinforcing processes. This hypothesis is considered here in relation to abnormal behaviours shown by ad libitum-fed and restricted-fed captive birds.

AD LIBITUM-FED BIRDS

Contra-freeloading

When given a choice between working for food and freely available food, pigeons and domestic fowls have been found to work for at least part of their daily food consumption. New evidence shows how food particle size and nutrient density are related to levels of feeding activity, contra-freeloading, and other forms of oral behaviourr.

Variation in feeding efficiency

Typically, feeding efficiency (g food eaten/min feeding) is lower in laying strains of fowl than in broilers, and varies with food form, time of day, and environmental complexity. Times spent feeding by laying hens in different environments are negatively correlated with ground pecking and scratching behaviour.

Object pecking

Object pecking (and "exploratory" pecking at food) in cages

substitute for ground pecking in pens. Caged hens with access to food for only part of the day showed stereotyped spot-pecking after the feeding period. It may reflect continued expression of foraging.

Feather pecking

Hens in pens with intermittent access to food showed ground pecking after feeding periods when litter was present, and feather pecking after feeding when it was not. This supports the proposal that feather pecking represents redirected ground pecking.

Route-tracing

Stereotyped pacing in hens is specific to the pre-laying context, but that seen in caged birds may reflect a more general effect of confinement.

RESTRICTED-FED BIRDS

The level of chronic food restriction imposed, and associated reduction in body weight, are correlated positively with levels of both general activity and expression of abnormal behaviour, and hence, presumably, with feeding motivational state and arousal.

Operant conditioning

Schedule-induced polydipsia, autoshaping, complex

stereotyped sequences, and other forms of "misbehaviour" have all been described in restricted-fed birds with various forms of operant feeding. The types of behaviour seen appear to be context specific in relation to food presentations. Contra-freeloading has also been demonstrated in hungry pigeons, but only after they had eaten substantial amounts of free food in test sessions.

Simple feeding schedules

Restricted-fed broiler breeders show increasing anticipatory pacing before their single daily meal and declining oral behaviour afterwards, some of which is stereotyped, and which is presumed to reflect persistence of unfulfilled foraging. Drinking, pecking at any non-food object (including litter) and preening can all substitute with each other as dominant post-feeding activities (hence distinction of "stereotypies" in this context may be misleading). During a period of mild food restriction in a l ayer strain, object pecking substituted immediately and completely for time that would have been spent feeding.

Despite the characteristic changes in broiler breeder behaviour before and after feeding, described above, feeding motivational state appears to remain consistently high at all times of day, judging from results of operant feeding tests. This apparent discrepancy may be accounted for by a distinction between motivational state and arousal.

A growing body of evidence is consistent with the notion of a primary role for homeostasis of arousal (Delius, 1970) underlying the changes in behaviour of restri cted-fed animals before and after feeding time.

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HOW DO FARM ANIMALS COMMUNICATE?

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1. Introduction

All animals communicate by some combination of visual, auditory, olfactory means and through physical contact. Such combination has critical roles in survival of individuals and the species since they have functions related to

protection, reproduction, maternal behaviour and learning. Understanding communication between animals and recognising their emotional state is a vital part of animal husbandry. Sensory abilities, meaning and significance of the signals animals are sending are often not very w ell investigated and understood. Visual signals are probably best perceived and understood by humans, but many of the olfactory messages cannot be detected and interpreted. Humans are aware of vocal communications by animals, but the meaning of most calls remain to be decoded. The following paper briefly discusses some basic principles of the sensory system and aspects of farm animal communication.

2. Sensation, Perception and Emotion

The five sensory systems that interpret stimuli from outside the body are vision, touch, hearing, smell, and taste. The general process of perceiving can be divided into two distinct phases called sensation and perception. Sensation refers to the process of detecting the presence of simple stimuli and perception refers to the higher-order process of integrating, recognising, and interpreting complex patterns of sensations. The perception of sensory stimuli is species-specific and depends on previous individual experience. As an example, potentially threatening individuals (such as humans) elicit emotional responses in pigs depending on their previous positive or negative

experience. The emotional response consists of three components: behavioural, autonomic and hormonal. The behavioural component consists of muscular movements that are appropriate to the situation that elicits them (escape attempts and vocalisations). Autonomic responses facilitate the behaviours and provide mobilisation of en ergy for immediate movements (increase in heart rate). Hormonal responses reinforce the autonomic response (steroid hormones support glucose availability for the muscles). In terms of communication, emotions are often demonstrated to others by means of postural changes and facial expressions. Charles Darwin (1872) already suggested that emotional expressions are innate and unlearned. More recent research tend to confirm Darwin's hypothesis that at least facial expressions of emotions are innate. Other means of communicating emotions, such as body movements and vocalisations are at least partly learned. Emotional responses to (threatening) stimuli are organised by a structure in the brain called amygdala, consisting of several groups of nuclei located within the temporal lobes. Thus, stimulation of the amygdala leads to emotional responses, and it's destruction disrupts them. Whether or not domestic animal species show emotional responses to environmental stimuli or to other animals depend on t heir cognitive abilities. Duncan and Petherick (1991) therefore suggested that animal welfare is dependent solely on the cognitive needs of the animals concerned.

3. Sensory Capabilities and Communication

Effective communication is a two-way process. Thus communication between animals depends on their sensory abilities to perceive messages. The following chapter summarises some species characteristics related to sensory capability and communication:

In general, farm animals hear, see and smell in a different way as humans do. Pigs and ruminants are able to hear higher frequencies and their visual field ranges from 300-360 degrees. All domestic animals have been shown to possess colour vision. Literature on farm animal behaviour is full of descriptions and interpretations on body movements and postures relative to social behaviour and communication. Less is known about the significance of olfactory cues and very little research has been done on auditor y signals and their function in animal communication.

a) Pigs

Auditory signals and vocalizations are well developed in pigs. Because pigs can not move their ears as well as other animals, localisations of sound are made by moving the head. Acoustical signals are important in the overall social organisation of pigs. Twenty different calls have been identified, of which six are easily recognisable to humans

(Hafez and Signoret, 1969). The most common auditory signals are grunts, barks and squeals. Hearing in pigs ranges from 42 Hz to 40.5 kHz, with a region of b est sensitivity from 250 Hz to 16 kHz.

The pig's vision is highly developed although visual signals do not appear to be as important as auditory and olfactory signals. The light wavelengths to which pigs are most sensitive range from 465 to 689 nm. Visual cues are used by boars to assess the reproductive state of the female. It is suggested that the tail position (tightly curled) is a good index of general well-being.

Olfactory stimuli serve to identify pigs individually. Ventral body surface is a preferred site of sniffing. Pigs can form a dominance hierarchy while blindfolded, providing evidence of the importance of olfactory stimuli.

b) Cattle

Hearing tends to be less important in cattle than vision, but it is of importance in inter- and intra-species communication. Schloeth (1961) describes eleven different calls in cattle. The low amplitude "mm" is a common call given by the cow to her calf. A "mmh" call is given when a cow is isolated. A hungry cow will give a high-intensity "menh" call.

Vision is the dominant sense use by cattle. Cattle can discriminate colour well, especially at long wavelengths (yellow, orange and red).

Olfactory cues are very important for sexual activity. Cattle distinguish conspecifics by odour of the urine. Male urine is more easily distinguished than female urine. Specific oestrus odours are released from the body surface, particularly from the genital region.

c) Sheep and Goats

Sheep and goats use vocalisation as a means of communication, especially if they become separated from the flock. The ewe learns the specific frequency of the lamb's "baa" and likewise the lamb learns the mother's. A high positive correlation exists between vocalisations and activity in lambs.

Sheep and goats use vision primarily as their means of communication. Sheep are gregarious and like to stay together, so they look up to see if they are still with the group. Totally blind sheep are abnormal in some behaviours. Stamping in sheep is a visual signal for aggression. Colour vision is similar to cattle.

Sheep and goats are able to distinguish conspecifics by means of olfaction. Olfactory cues are very significant for the recognition of the young by the mother.

d) Chickens

Chickens do not have an ear lobe, but they have a well-developed ear. Calls range from 250 Hz (the broody hen "cluck") to about 6 kHz (distress call). Hearing in general ranges from 60 Hz to 12 kHz.

The visual field is about 300o with a binocular field of 26o.

Their acuity (sharpness) is good and they have good distance vision. Chickens can discriminate between squares, triangles, red and black dots. They prefer to peck at round rather than flat objects.

The sense of smell is considered to be poorly developed. It is suggested that blood ca be smelled. Chickens are known for their sensitivity to detect minor water temperature differences.

4. Conclusions

Understanding the sensory capabilities and means of

communication is critical for the care and welfare of farm animal husbandry. The meaning and significance of the signals animals are sending are often not very well investigated and understood. Communication between humans and animals are becoming more important as social communication between animals is often disrupted in modern husbandry practices. Olfactory and visual systems are probably the most important factors in an animal's recognition of other animals and humans. The existence of this ability in animals underscores the importance of interactions with other animals and/or humans. Since sensory recognition involves learning and memory and since these are based in neural areas of the brain normally associated with emotional responses, it is logical to conclude that cognitive processes are involved.

5. Literature

Literature on the subject can be requested from the author.

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FREE PAPERS

VOCALIZATION AND SOCIAL MOTIVATED SPATIAL ORIENTATION OF CHICKEN

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Introduction

Objective evaluation of behavioural reactions in farm animal is of major importance for welfare research. With the introduction of a numeric analysis of sound signals in chicken we have the ability to quantify this behaviour. Therefore we use the distress call (COLLIAS & JOOS, 1953) as a model for an examination of environmental influence on

animal behaviour.

The chicken is a social animal and especially the chick need social contact for a normal development. So we have focused our interest on social requirements as refected in the calls of chick. One important function of the distress call is the reestablishment of social contact after its loss. This is expressed by the German word "Verlassenheitslaut".

In our laboratory we use three behavioural tests combined with numeric sound analysis for the components of social behaviour:

The social reinstatement test is a modified open field test following the method created by MILLS & FAURE (1983) as a test of social proximity behaviour in quail.

The step isolation test is an open field test of groups with succestive reduction of group size.

The individual isolation test an open field test with total visual and auditory isolation of a single animal.

Materials and Methods

In the Social-Reinstatement-Test each animal has to find its way to a hidden group of animals. The test compartment is

a modified open field with a group of animals as a goal. On the start point, the animal can not hear the vocalization of the group. In this part of test the animals show the typical open-field-behaviour. For orientation, we take the time until the crossing of the line to the compartment with acoustic stimuli (ta) and time of to reach the group (tg). Then we estimate the social rea ctions of animal by the degree of turn to the group within the next 5 minutes (for a comprehensive description see MARX & LEPPELT, 1995).

For the Step-Isolation-Test a variable number of animals were moved from their home unit to a sound attenuated chamber. In the test chamber the chicks were acoustically and visually isolated from the rest of the housing group. During a 4 minutes period, all calls were recorded, after which the group was successively reduced in size removing one chick at a time. The 4-minute call recording procedures with the subsequent removing of animals was repeated until a single chick remained. This procedure al lowed us to determine the variation of vocalization of the distress calls with the number of animals in the Step-Isolation-Test.

A considerable social stress was included at the beginning of the test in that way that size of the isolated group was reduced by approximately 50 % in the number of animals. Throughout testing, vocalizations were recorded by a tape recorder.

For individual isolation test each animal was taken carefully from their home box and placed in a sound proof test box. The animal in the test box can not see or hear its companions. Distress vocalization from each chicken was recorded by a tape recorder (REVOX BR99).

The call sonagrams of samples were calculated on a signal analyser MOSIP 3000 (MEDAV). The numeric sound analysis was made from this sonagram on a PC by a program described by MARX (1993).

Results and Discussion

Long time structure of vocalization

In this experiment we tested 33 meat type chicken on day 6 or 7 of life in the individual isolation teat (IIT) and on day 8 or 9 in the social reinstatement test. We measured the duration of inter call intervals (ICI) in the first 80 sec of vocalization during the IIT.

The distribution of ICI is typical for a behaviour with a bout structure. We can use an ICI of about 0,5 sec as inter bout interval. The bout lenght varies in a wide range (1 to 120 calls/bout). The highest frequencies have the shorter bouts. 71,1 % of the bouts are shorter than 10 calls per

bout. But the majority of calls were emitted in long bouts (52,95 % of calls in bouts with 20 and more calls). Only 2,53 % of the calls were emitted as single calls.

The formation of bouts varies between animals. So we have determinated the median of bout lenght (MBL) and the number of first long bout with 10 or more calls per bout (FLB) for each animal. The parameters of long time structure of distress vocalization - median of bout lengh, latency of first call (to), the number of calls in 80 sec (n) and first long bout - were compared with body condition and reaction in the Social-Reinstatement-Test (MARX & LEPPELT, 1995) as shown in Table 1.

Table 1: Means of bout parameters for animals assigned to groups by body weight and the degree of turn to group behaviour or orientation speed in the social reinstatement test

	body weight		turn to group		orientation speed		unit
	< mean	> mean	< 0.5	> 0.5	< 5 min	> 5 min	
t0	2.53	3.37	4.82	2.08	4.16	1.25	sec
MBL	22.5	5.17	20.0	9.03	14.82	9.77	calls
n	161.28	150.0	160.84	154.13	151.45	159.92	calls
FBL	4.64	8.0	5.54	6.33	6.4	6.85	bouts

Animals with lower body weight showed significantly more calls in longer bouts. Chicks with a fast orientation reaction in the Social- -Reinstatement-Test have a shorter latency until the first call.

Comparisons of call features revealed differences between single call short bouts and long bouts. Single call are in general shorter and have a lower energy ($p<0,05$). This is a sign for lower distress (MARX & LAUBE, 1994). The calls in short or long bouts were not different. The differences in call parameters between most of the animals were significant. But they have the same direction in calls from short bouts as in calls from long bouts.

Call structure and Social-Reinstatement-Test

In the second experiment we used 20 meat type chicken from buildings with two different management procedures:

Building A - approx. 23000 animals, 24 h-light cycle

Building B - approx. 18000 animals, natural day and night

We recorded the distress vocalization during tha Social--Reinstatement-Test. The orientation speed of animals was not influenced management, but the degree of turn to group (DTG) differed significantly (Stable A: DTG=0,370, Stable B: DTG=0,531; $p<0,05$)

The animals in stable B showed in general more behavioural activities as those in Building A. The analysis of distress calls also revealed longer duration and a higher energy of calls as in Building B. This may be a sign for a higher state of excitement by animals in the SRT.

For a better understanding of the behavioural responses animals we divided the animals in two groups according to orientation speed (slow, fast) or turn to group reaction (high, low). The emotional call parameters (call duration and coefficient of energy concentration) showed significant differences between the stables only in the groups with slow orientation or high social reaction (degree of turn to group). These data are arranged in Table 2.

Table 2: Means of call parameters from animals assigned to groups by orientation speed and degree of the turn to group behaviour in the Social-Reinstatement-Test. (SD in parantesis)

	orientation speed				turn to group			
	fast		slow		high		low	
	tg < 5 min		tg > 5 min		DTM > 0.5		DTM < 0.5	
building	A	B	A	B	A	B	A	B
CD	159.1	159.0	150.6	182.9	152.3	157.3	153.8	160.7
[msec]	(16.98)	(21.57)	(23.53)	(31.64)	(8.02)	(24.23)	(22.55)	(18.8)

TSA	20.82	31.6	4.89	9.12	24.52	51.52	10.84	11.68
[AV]	(25.64)	(40.4)	(3.23)	(3.7)	(29.38)	(48.41)	(14.78)	(12.48)
CEC	41.02	42.3	38.31	42.26	39.61	43.8	40.45	40.8
[%]	(6.54)	(5.58)	(4.63)	(5.93)	(7.68)	(6.42)	(5.15)	(4.19)
PFmax	4220	4468	4210	4165	4215	4287	4212	4670
[Hz]	(342)	(260)	(226)	(123)	(405)	(155)	(232)	(196)

CD - call duration; TSA - total sum amplitudes; AV - amplitude value; CEC - coefficient of energy concentration; PF - pitch frequency

Conclusion

The numeric sound analysis of distress calls can provide new information above the state of excitement in chicks. The bout structure is also an important feature of distress vocalization. The icteractions between body condition, orientation behaviour and vocalization in isolation show the sensitivity of the control system of vocalization. The analysis of short and long time structure can be provide more information about animal environment interactions.

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BEHAVIOUR OF INDIVIDUALLY REARED PIGLETS

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At birth, the continuous nutrient supply abruptly ceases, and newborn piglets begin their postnatal life with minimum energy stores available. A rapid formation of the biological unit mother-litter aimed at their nutritional needs is therefore crucial for piglet survival. This bond is behavioural in character with a sequence of events leading to milk ejection by the sow and milk ingestion by the litter. The highly organized unit is destroyed when piglets are transferred to solitary nutrition, as it is with early weaning (Holub 1994). We used this method of weaning (Holub 1964) to study some of the food intake control mechanisms in individual piglets from day 1 of postnatal life (BaranyiovA & Holub 1989, BaranyiovA 1991). Along with change in character of food consumption their feeding behaviour changed. We therefore studied in more detail the transitory phase from an initial short maternal nutrition to solitary feeding of piglets.

Food intake and behaviour of piglets separated from their mothers and littermates between 12 and 24 h of birth were recorded. The piglets (group A n=30, group B n=15) were kept individually in cages (40 x 40 x 40 cm) in a thermoneutral environment. The floors of the cages were heated to 38 oC. After the piglets were 7 d of age, the temperature of the heating pads was gradually decreased. The arrangement of cages for group A made a visual, auditory and olfactory contact between piglets possible wh ereas for

group B, visual contact was eliminated.

The piglets were bottle-fed a milk diet Selasan (group A) or Purina (group B) warmed to 38-40 oC, offered to them 9 times a day from 6 to 22 h. They were able to suckle the diet, except for an 8 h pause at night, at 2 h intervals to satiety. They were weighed daily before the first feeding, and their diet intake was measured by weighing the bottles before and after feedings. In group B, observations and videorecordings were made.

On the day of weaning, the piglets in group A required 2.6+ 0.25, and in group B 3.5+0.3 "feeding sessions" to begin active suckling. The diet intake in group A gradually increased from 5.6+1.8 at 14 h to 35.0+1.9 g at 22 h, in group B from 1.0+0.4 to 26.6+3.40 g. On day two, the diet intake began to be more evenly distributed over the 9 feedings, and oscillated between 34.8+2.7 and 48+4 2.4 g in group A, and between 29.7+5.4 and 45.0+3.6 g in group B. The diet portions were consumed in 26.0+2.2 s on day 2 (i.e. 1.61+0.15 g of the diet was consumed per second), in 24.5+4.5 to 48.5+4.5 s on day 3. A prominent feature of the feeding behaviour in piglets is nosing. Having lost their source of nutrition as the nosing object when reared individually, they gradually began to show this behaviour again after a lapse of 4-5 days in that they were nosing against the cage walls in anticipation of feeding. It was

most prominent and coordinated between days 8 and 14-15. Only exceptionally did they show n osing after feeding.

It is concluded that different nutritional environment and partial isolation from social experience crucial for survival under natural conditions affect also the behaviour of piglets. Nevertheless, the mechanisms involved in meeting the nutritional needs of piglets, also the behavioural ones, are highly flexible, and enable them not only to survive but to thrive and grow rapidly.

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INFLUENCE OF NURSINGS WITHOUT MILK EJECTION ON PIGLETS MILK INTAKE AND WEIGHT GAIN

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In domestic pigs, up to 30% nursings occur without milk

ejection (non-nutritive nursings). Little is known about the causes and significance of such nursings. The aim of this study was to investigate whether non-nutritive nursings, when included into a regular rhythm of nursings with milk letdown, affect udder massage, milk intake and body weight gain in early lactation. On days 7 or 8 post partum, seven sows were manipulated to nurse every 70 min (group MIN70) for a period of 24 hours, and preliminary five sows were enforced into the same 70-min interval with non-nutritive nursings 15 min after each milk ejection (group MIN70+15). The piglets had a possibility to massage the udder for 10 minutes during both nutritive and non-nutritive nursings. Milk intake was estimated by the weigh-suckle-weigh method. First results show that the total duration of udder massage was considerably longer in group MIN70+15 (medians 281 vs. 143 min, Mann-Whitney U-test, $p=0.005$). In both groups some sows used to interrupt the nursing early after milk let-down while others allowed a long udder massage. In both groups litters massaged the udder for at least 10 minutes from 70% to 100% (median 100%) of all nursings with milk ejection which were not interrupted by the mother. In group MIN70+15 the sow allowed udder massage by piglets in 91% (median) during non-nutritive nursings. The piglets massaged the udder in 72% during such nursings. This indicates a high motivation for massaging by piglets in both g roups and by mothers during non-nutritive nursing. However, during the whole 24-hour- period the weight gain was the same in both

groups (140 g vs. 144 g, t-test, n.s.). Both groups have nearly the same decrease in weight gain during the 24-hour manipulation of nursing rhythm in comparison with the weight gain during a unmanipulated period 24 h one day before (group MIN70+15 decreased 28% and group MIN70 decreased 32%, ttest, n.s.). Our results suggest different explanations. First, the effect of m assage during non-nutritive nursings occurs later. Second, the massage during non-nutritive nursings has no influence on milk production. Than the question remains, why do piglets massage so long during non-nutritive nursings?

THE ROLE OF INTERVALS BETWEEN NURSINGS IN MILK TRANSFER IN THE DOMESTIC PIG

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Domestic sows nurse about 20 times a day in early lactation, but the typical inter-nursing interval differs among individuals and often changes significantly within the same sow. The role of inter-nursing intervals (INI) in determining milk production was studied in 2 experiments.

First, nursing intervals and milk intake were recorded for 6 hours on each of the 3 first days p.p. in 12 litters. Seven out of 12 sows decreased or increased their INI by 20% to 50% either between Days 1 and 2 or between Days 2 and 3. The change in INI was negatively correlated with the change in milk production (Spearman $rS=-0.85$, $p<0.001$ for Days 1 and 2; $rS=-0.68$, $p<0.05$ for Days 2 and 3).

The second experiment was performed on 7-days-old litters. Eight sows were manipulated to nurse their litters every 35 minutes for a period of 24 hours (group MIN35) and 8 sows were enforced into a 70-min nursing interval (group MIN70). Milk intake was estimated by the weigh-suckle-weigh method. Piglets from MIN70 litters ingested on the average 39% more milk at each nursing (27.2 g vs. 19.6 g, t-test, $p<0.01$). However, during the whole 24-hour-period, MIN35 piglets ingested 25% more milk (694 g vs. 553 g, t-test, $p<0.05$) and gained 44% more weight (196 g vs. 136 g, t-test, $p<0.01$). In this experiment, we also analyzed differences between the 2 group in udder massage after milk ejection. In both groups, some sows used to interrupt the nursing early after milk ejection while others allowed a long udder massage. MIN70 litters massaged the udder for at least 10 minutes in 84% of all nursings which were not interrupted by the mother, whereas the MIN35 litters used this opportunity in only 35% of n ursings (Mann-Whitney Utest, $p=0.01$).

We propose that spontaneous changes of the nursing rhythm in early lactation may profoundly affect milk intake, weight gain and udder massaging behaviour.

ETO-FARM

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ETO-FARM JAkotpuszta-Bercel was established according to the provisions of the Committee of the European Convention for the Protection of Animals, with special regard to ethology, thus setting a model for Hungarian and other European specialists, particularly young colleagues. It is primarily a milking sheep farm with 1000 milking sheep and it is:

- specialized for quality products and based on traditional farming; in the milk processing plant of the farm ewe-cheese of very good quality will be produced thus widening the range of marketable Hungarian food products;
- farming according to the ecological conditions:
- maintaining the so called "puszta" farming culture;
- model for sustainable animal Husbandry, animal welfare on

the basis of European standards;

- model for the farmers of the region, Hungary and Eastern

Europe;

- training farm for students of European universities;

- practical training base also for the students of secondary

and agricultural technical schools;

- planned to carry out applied research;

- supporting the native "cigAja" sheep (1000).

EFFECTS OF INDOOR AND HUT HOUSING SYSTEMS ON CLINICAL AND PHYSIOLOGICAL INDICATORS OF PREGNANT AND FARROWING SOWS

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In Germany public interest in animal welfare has increased and the animal protection law was

tightend. At the same time the improvement of housing systems for sows has been one of the most

important tasks for applied ethology during the last years. The st

udy presented investigated the effects of three different outdoor and indoor housing systems on sows

over a period of 12 months.

The following clinical and physiological indicators were used:

Clinical Condition

Rate of Illness

Breeding Performance

Red and white Blood picture

Bloodgas Status

Products of metabolism in the Blood

Antibodies and Contents of the milk

Serum Electrolytes

Serum Enzymes

It was shown, that the sows of the outdoor housing system were more often covered with dirt, they had a higher incidence of skin-lesions and lameness than the sows of the indoor housing system. On the other hand the animals of the outdoor system had less itches and flaking skin and they show less grazed udders.

The indoor kept sows showed an eosinopenia caused by stress. In the outdoor housing system the oxygene saturation in the blood of the sows was lower. The activity of the alcaline phosphatase was lower and the concentration of the creatine kinase was higher compared to the animals in the indoor housing systems. The content of iron in the serum of sows was higher in the outdoor system, whereas the concentration of Creatinine was lower than in the indoor kept sows.

The higher rate of sows covered with dirt in the outdoor system was caused by natural behaviour patterns like wallowing and digging in the pasture. This can be rated positively in terms of animal welfare. Although the dirt should not consist of manure and urine, because of natural behaviour reasons as well as hygienic aspects.

The result of the clinical examination shows skin lesions in all three housing systems. A higher number of scratches in the outdoor housing system confronts with more grazed udders caused by the interior of the housing system. The skin lesions were caused by inadequate housing systems which the animals could not adapt to.

The physiological indicators show, that the metabolism of the animals is affected by the housing system. The low number of eosinophilic granulocytes in the sow blood of the indoor housing systems are a sign for a stress of some kind. The stress syndrome causes an eosinopenia in the blood. In the outdoor housing system the activity of the animals, the social interactions and the influence of the outdoor climate lead to a higher utilisation of oxygene, which appears in a lower saturation of the venous blood with oxygene than in the indoor housing systems. The higher activity of the alkaline phosphatase in the outdoor housing system shows, that the skeletal metabolism is increased by regular

activity and exercise. The low concentration of the creatinkinase indicates, that regular exercise prevents overstrengthening muscular stress, causing cell destruction.

None of the housing systems tested in this study has shown unlimited positive results. Summarizing, the system in which the animals were kept in groups outdoors were better for the animals than the indoor housing systems with individual kept sows.

The low input of cost and energy as well as the flexibility of outdoor housing of pigs in huts makes this system interesting from the view of business management. In addition, in Germany the acceptance of outdoor housing of pigs by the consumers, makes it profitable in certain programs for quality meat.

CHANGES IN THE BEHAVIOUR OF ANIMALS IN RELATION TO BREEDING LEVEL

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Manifestations of animal behaviour represent obviously the most plastic component of the phenotype which represents not only the compaction of animal and the major part of its physiological functions but also reflects in the most rapid way its health condition. In animals, behavioral changes are usually very closely associated with their domestication. Genetically conditioned changes in individual activities as well as the adaptation of animals in the course of domestication were correlated with changes in their body morphology and in their physiological functions. In the course of evolution, individual populations adapted themselves under given environmental conditions to produce the optimum forms of survival and it can be concluded that preferred were those individuals which were adapted at best. Within the process of domestication, when the criteria of selection were defined by Man, the differences between wild and domestic animals became wider and wider. The process of domestication may be defined as a selection pressure directed against those genotypes which are sensitive to stress factors. This results in a marked reduction in both defensive and escaping reactions of cultural breeds of animals. Changes in both locomotion activities and swiftness of animals are also usual. The difference between wild and domestic animals of the same species consists also in the magnitude of threshold stimuli of the same reaction. The

authors define domestication as a process in the course of which t he populations of wild animals adapt themselves to the presence of Man and conditions of confinement and when the genotype of animals becomes to be combined with environmental effects. Individual capacities animals to adapt their behaviour and physiological functions then define the degree of their domestication.

The authors mention five categories of behavioral changes which are conditioned by the process of domestication:

- changes of quantitative nature (reduction of distrust threshold in relation to Man)
- dissociation of related forms of behaviour
- limitation of specific stimuli of perception
- persistency of manifestation of juvenile behaviour in adult age
- changes in behaviour as conditioned by morphology of animals

Genetic mechanisms influencing the behaviour of animals under conditions of domestication pressure were studied by Newman (1994). This author followed interactions genotype-environment and paid attention also to transgenous animals. NovackX and Liday (1994) mentioned that such traits as emotionality, adaptability and stress resistance may be genetically conditioned. They pointed out the sensitivity of young hens to photo- stimulation which, in their opinion,

were associated with the degree of domestication. They found out that in young hens of a broiler line of domestic fowl the response to photostimulation was reduced, the onset of sexual maturity was delayed and the production of eggs was decreased. These authors explain these phenomena on the basis of reduced flow of light and decreased activities on the axis hypothalamus, hypophysis, ovarial glands. At the same time it is also possible to observe changes in the behaviour of flock as related to reproduction. Boivin et al. (1994) evaluated effects of cattle genotypes on the sensitivity of animals and their perception. They emphasized the importance of the first three months of the age of calves for the formation of their good relationship to Man. Behaviour is considered to be that component of genotype which enters the process of evolution not only as its result (consequence) but also as one of its moving forces. Our considerations are based on the relationship existing between the organism and its environment and, especially, on th e fact that the behaviour of animals does not form only a given species but that it is important also for the formation and a further development of the whole ecosystem. Changes in the behaviour of animals in dependence on the degree of selection (i.e. on the intensity of the process of domestication) demonstrate the evolution which takes place in this field of research and may also indicate the requirements of animals to their environment and welfare formation.

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THE DISTANCE OF BREAST-FENCE ARMS AND MANGER BOTTOM HEIGHT - REQUIREMENTS OF VARIOUS AGE CATEGORIES OF HEIFERS

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Parameters of manger and breast-fence with regard to the needs of heifers at the age of 6 to 12 months were studied. The obtained data with the hitherto valid norm which determines the height of manger bottom to be 10 cm over the level of standing, and spacing of breast-fencing arms 17 cm for animals at the age of 7 - 15 months were compared. Special equip- ment-standing for one animal was constructed for these observation. The height of manger bottom, width of feed place and width of manger (spacing between the back wall and the manger edge from the side of cow) as well as the spacing between the breast-fencing arms were adjustable there. The experiments were performed with the feed place

width 120 cm, manger width 100 cm, manger edge height from the side of cow 50 cm and with the bottom heights 0, 5, 10, 15 and 20 cm over the standing level. The spacing 17 cm of the breast-fencing arms was the basis of our measurments. We narrowed the spacing by 2 cm in addition, however, we broadened it during the further observations by 2 cm till some of the animals passed the breast-fence with its shoulder joint. There were 7 animals in the experiment. We changed all combinations of the bottom height and fencing arm spacings with heifers at the age 180 + 10 days in the course of 30 days. The same observations were performed at the age of 9 and 12 months. We processed the measured values by means of 2-way variance analysis and pair test. The spacing of breast-fencing arms 19 cm appeared to be excessive for 6 months old heifers, 23 cm for 9 months old heifers and 25 cm for 12 months old heifers. We consider the spacing of 17 cm for 6 and 9 months old heifers, and 21 cm for 12 months old heifers to be suitable. There were no significant differences in the relation to the maximum reach into manger between the spacing of breast-fencing arms in any of the age categories. However, the height of manger bottom influences the reach very much. The differences in reach at various manger bottom heights s how it is more suitable to use the spacing of breastfencing at which the change of bottom height influences the reach only little. We consider the bottom height 15 cm over the level of standing to be the optimum one.

CAGE TYPE, NEST QUALITY AND VISITS OF RABBIT DOES IN THE NEST IN RELATION TO PUP MORTALITY AND BEHAVIOUR

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High pup mortality in rabbits kept in large scale production units may be caused by unsuitable environment and by poor maternal behaviour of rabbit does. In this experiment the nest quality and behaviour of White New Zealand rabbit does and pups (70 litters) were compared in two types of commercial wire cages: (A) with wooden nest box attached to the cage, or (B) with nest box created by dividing the wire cage by a partition. The mortality rate up to the weaning was significantly lower in A than in B cages (9.8 and 16.8 % respectively, $P<0.02$). There were 11, 52 and 37 % nests of poor, medium and good quality in A cages and 16, 29, and 55 % nests of poor, medium and good quality respectively in B cages. The quality of nest significantly influenced the mortality rate; the highest mortality was recorded in the case of poor nests in B cages. Does kept in B cages were seen significantly more frequent in nest boxes both before and after parturition as compared with A cages. Pups born in

A cages lef t the nest boxes from the age of 15 days significantly more often than those born in B cages. Pups born in nest of good quality were found significantly less outside the nest box. The mean temperature of pup skin and inside the nests was significantly lower in B type of cages. In conclusion, the maternal behaviour of rabbit does differed quantitatively depending on the type of cage. The cages with wooden nest boxes offered better enviromnemt for rearing pups.

TYPES OF HIGHER NERVOUS ACTIVITY IN MACHINE MILKED EWES AND INFLUENCE OF TYPES OVER FUNCTIONAL PARAMETERS OF THE UDDER AND GRAZING BEHAVIOUR

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The purpose of investigation was to fix which of behavioral reactions during the machine milking are most expedient for determination types of higher nervous activity and what is the influence of types over functional parameters of the udder and grazing behaviour.

Machine milking behaviour of 46 Local Stara Zagora Ewes was

examined during the process of production. The animals were of the same bread, age, date of lambing (10 days), number of lambs and type of the udder. Six behavioral reactions were observed during machine milking: taking position into the milking parlour, feed reaction, activity towards the neighbours, feed reaction towards forage offered by hand, reaction towards positioning teat cups, persistence of taking place into the milking parlour.

Individual observations and examination marks in relation to each of reaction was carried out. Ewes were classified into four types by means of examination marks and differences between reactions: 1. Sanguinic type, 2. Choleric, 3. Phlegmatic and 4. Melancholic. Functional parameters of the udder were measured with a "Vimer - 1" and chronometer. Parameters of the udder were calculated by following formulas: 1. Total milk (Mt) = Machine milking (Mm) + Machine stearing (Ms). 2. Total milk time (T t) = Machine milk time (Tm) + Machine stearing time (Ts). 3. Discharge of milk (Dm) = Mm/Tm. 4. Discharge of milk first 30 s (D 30) = Milk first 30 s (M 30)/30.

Grazing behaviour was studied during 7 serial days using the same animals and observing moving to the pasture, grazing and home-coming. It was distinguished 4 positions in the flock: 1. A front line 2. In the middle of the flock 3. Out of the way 4. At the rear of the flock.

Conclusions: A. The main behavioral reactions to determine types of higher nervous activity are: 1. Feed reaction towards forage offered by hand 2. Activity towards neighbours 3. Feed reaction 4. Reaction towards positioning teat cups. B. The most considerable measure to distinguish types are two functional parameters - Dm and D30. C. Functional parameters of Local Stara Zagora Ewes are highly influenced by the types. D. Sanguinic type ewes move and graze on the pasture - 75 % a front line, Melancho lic and Phlegmatic - 62-64 % at the rear of the flock.

GABAERGIC MODULATION OF BEHAVIOUR IN RESTRICTED-FED BROILER BREEDERS

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>From earlier work, we concluded that the dopaminergic system probably plays a crucial role in control of stereotyped oral behaviours induced by chronic food restriction in broiler breeder fowls. As there is growing evidence of interactions between GABAergic and dopaminergic pathways (Scheel-Krbger 1986), the aim of the two experiments reported here was to

study effects of treatment with preferential antagonists and agonists of GABA-A and GABA-B receptors on the oral stereotypies of broiler breeders. In each experiment, 8 immature female birds were caged individually and fed daily according to a commercial food restriction programme. They received 8 intravenous injection treatments (2 drugs at 3 doses and 2 saline controls) on 8 days over 3 weeks, each bird receiving different treatment on each day according to a Latin square design. Feeding time was 0900h, injections were 1 h after feeding, and behaviour was recorded on video for 3h after injection. Measurements were made from the videorecordi ngs in alternate 15-min periods by noting each bird's behaviour every minute, according to one of six categories: sitting, standing, pacing, preening, object pecking, or drinker directed activity. The last two activities were stereotyped in form.

The most pronounced behavioural effects of the GABAergic compounds were the effects of muscimol on motor functions. High dose of muscimol caused increase in sitting and standing, while medium dose caused delayed increase in pacing. Similar biphasic action of muscimol on locomotor activity - excitation at low and depression/sedation at high doses - was described in mice (Scheel-Krbger et al., 1978, Tirelli et al., 1991).

Within the range of doses used GABAergic agents did not

affected significantly the environmentally induced stereotyped behaviour in broiler breeders. While apomorphine induced stereotyped behaviour in fowls (Nistico, 1980) was stimulated by bicuculline and tetanus toxin, given into the paleostriatum augmentatum or into the lateral ventricle, systemically administered GABA receptor antagonists reported here caused only some increases in object pecking (low dose of bicuculline and high dose of 5-amino valeric acid), none of which reached the level of statistical significance. Similarly, while apomorphine-induced stereotyped behaviour in chicks was suppressed by intracerebroventricular treatment with ethanol- amine-O-sulphate, an inhibitor of GABA-transaminase activity (Nistico, 1980), there was only slight (nonsignificant) suppression of object pecking in the first hour after the high dose of muscimol recorded in restricted-fed broiler breeders.

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ALIMENTARY MOTHER/LITTER INTERRELATIONSHIP IN RATS

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It is indispensable for survival, growth and maturation of of the mammalian young to live under the care of a lactating female. During a definite period the maternal milk is the sole and unique source of food, water, ions, hormones and antibodies. By means of direct isotope methods it has been revealed that this important period of common life corresponds to 28 days in laboratory rats under standard conditions of breeding. According to the type of nutrition these 28 days could be divided in to two phases: 1) the suckling phase, within which the rat pups consume mother's milk only; the quantity of milk intake increases until the day 15 at which point it reaches maximum values; 2) the weaning phase, when the milk consumption begins to decrease step by step after day 15 and spontaneously stops on about day 28; at the age of 17 days the young begin to take in solid food and 2 days later to drink water as well; relatively to the decrement of maternal milk consumption the amount of diet and water ingestion increases. The time dimension of this mother/litter interrelationship is considerably stable: as to the possibility of influencing its duration in a nutritional way, such efficiency was observed following suboptimal nutrition of the mother and of the offsprings caused by protein insufficiency. The

undernourished young spontaneously displayed a delayed weaning on the 35th day of life. An auxiliary effect on milk fat utilization was exerted by the coprophagy of special maternal faeces having a high content of bile acids produced by the lactating female between the 15th and the 28th day of life of the young. The consumption of these faeces by the young started at the age of 16th days; the quantity of this consumption gradually increased and abruptly attained the highest values on day 25. This day perfectly agrees with the age when the maturation of the intestinal wall is being accomplished. Then, the coprophagy tended to decrease and fully ceased on the day of weaning. In the und erfed young, on the one hand, the coprophagy was higher by one order of quantity, on the other hand, it was prolonged until the day 35. Alimentary mother/litter interrelation including the auxiliary mechanisms of food utilization are determined not only by the age of the young, but also by the course of their maturation. Here it is relevant that any intervention into the natural dynamics of the nutritional relation in question raises in fact the 'time of weaning' problem; if there namely a premature weaning would occur, then negative consequences ought to be expected in the development of phenotype in the young, as it has earlier been demonstrated.

POSTERS

ETHOLOGICAL-PHYSIOLOGICAL CHARACTERISTICS OF IDENTICAL TWINS OF CALF

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The purpose of this work was to reconsider the level of the agreement of the ethological and physiological indexes in experimental situations at identical pairs of calfs. There were included 7 identical pairs of calf to the experiment which were obtained by transfer of bisectional embryos.

The comparation of ethological characteristics was based on 60 min test of the habituation and on 24-hours etograms in three repetitions. The selected biochemical indexes were watched at experimental burdens as imobilization, analimentation and alimentation. The imobilization was lasting 4 hours, the analimentation 48 hours and after it was following the repeated alimentation. The leavings were taken in 10 - 60 minutes temporal intervals according to the elaborated method. There were taken als o the leaving at the standstill in the stable for finding out the values of watching indexes and the influence of circadiann rhythm on thier dynamics in the blood. The proclamed results were based on the comparation of the agreement of the individuals inside the identical pairs and among the pairs each other.

Conclusions:

1 The identical calfs twins which were obtained by bisection of the early embryos correspond statistically by in habitual charakteristics. More significant agreement is at movement activity as at vocal demostrations in point of view of the length of the habitual phase and of the decomponing of the movement activity during the day.

2 The level of the agreement of the individual identical pairs at the movement activity and at the vocal demonstrations is different during the 60 min test. It follows from that reality that it is a test of the neuroreflexion which is very unstable to the environmental factors.

3 There was found out the highest agreement of the identical twin in the concentration of glucose and cortisol among watched biochemical indexes, which dynamics is most connected with the direct reaction of the organism to the environmental conditions. High agreement of the identical turns in inborn constitual type follows from that.

4 In the concentration of the T3 and T4 were found out differences between the watched pairs and also between the individual calfs. The global tendency of the changes of the concentration of lipids, T3 and T4 approximately the same owing to the charged situations after the imobilization,

analimentation and repeated alimentation is approximately the same but there are expressive differences at the individual level of reaction of the identical twins.

INFLUENCE OF THE TYPE OF HIGHER NERVOUS ACTIVITY OVER GRAZING BEHAVIOUR IN MILKING EWES

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Machine milking behaviour of 46 Local Stara Zagora Ewes from the experimental farm of Institute of Cattle and Sheep Breeding were examined during the process of production over the milking period of 1992. The animals were of the same breed, age, date of lambing (10 days), number of lambs and type of udder. Six behavioural reactions were observed during machine milking: taking position into the milking parlour, feed reaction, activity towards the neighbours, feed reaction towards forage offered by hand, reaction towards positioning the teat cups, persistency of taking place into the milking parlour. Individual observation and examination marks in relation to each reaction were carried out. Ewes were classified into four types of higher nervous activity by means of examination marks and differences

between reactions: 1. Sanguinic type, 2. Choleric, 3. Phlegmatic and 4. Melancholic. Grazing behaviour was studied during 7 serial days using the same animals and observing moving to the pasture, gra zing and home-coming. It was distinguished 4 positions in the flock: 1. a front line (near by the shepherd), 2. in the middle of the flock, 3. out of the way, 4. at the rear of the flock.

Conclusions: Behavioural reactions observed are reliable to determine the type of higher nervous activity. A large proportion of ewes are melancholic type - 34.8 %, following by Choleric - 26.1 %, Sanguinic - 21.7 % and Phlegmatic - 17.4 %. Grazing behaviour in the ewes is influenced by the type of higher nervous activity. Sanguinic type ewes move and graze on the pasture - 75 % a front line (near by the shepherd). Melancholic - 62-74 % and Phlegmatic - 49-64 % at the rear of the flock. Results in C holeric are intermediate.

EFFECTS OF HANDLING ON HEART RATE AND BEHAVIOUR IN YOUNG KONIK HORSES REARED UNDER STABLE AND FREE ROAMING CONDITIONS

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Twenty nine foals of the primitive breed Konik Polski born either in the stable group or in a free-roaming group which was kept in a forest reserve, were used for this experiment. The experimental group of foals (E) received more intensive contact with humans during the daily handling, whereas the control group (C) had a routine contact with humans only. The handling procedure began from the age of 2 wks onwards in the stable foals and from the age of 8 mo in the foals born in the reserve after they had been weaned and reared further in the stable. Ethological tests were conducted at the age of 6, 12, and 18 mo in the stable foals and at the age of 12 and 18 mo in foals born in the reserve. Behavioural reactions of foals were classified in a 5-point scale and the heart rate was recorded telemetrically during catching in box, catching on paddock, leading away, elevation legs for hoof control and approaching of an alien person. The E horses were much easier to handle and demonstrated lower heart rate during the tests. The effect of the intensive contact with humans was more pronounced in young horses born in the reserve. The horses born in the reserve reacted more fearful than stable horses at the age of 12 mo but this difference disappeared at the age of 18 mo. In E foals at the age of 6 mo none of the handling

manipulations influenced the heart rate but the C foals demonstrated elevated heart rate shortly after catching in box. The horses at the age of 12 and 18 mo reacted with the ele vation of heart rate specially during catching on paddock and leading away. It was concluded that previous intensive contact with humans significantly influences all behavioural and emotional reactions of young horses during handling.

FEARFULNESS IN THREE LINES OF LAYING HENS AND RELATION TO EGG PRODUCTION

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The fright reaction in laying hens kept in battery cages is an undesirable trait which may be connected with a behavioural phenomenon called "hysteria" in caged poultry. In this experiment the fearfulness in three lines of hens; Sussex (SS, n=41), Rhode Island Red (RR, n=45) and crossbred Sussex x Rhode Island Red (SR, n=42) was compared and relation between fearfulness and egg yield, egg weight, egg shell hardiness and quality, was investigated. The fearfulness was estimated in a test in which the reaction of

hens to an unknown object held in the front of cage was classified into 3 categories: (A)-pecking at the object = "boldness", (B)-no reaction = "indifference" and (C)-trying to escape/avoid = "shyness". The test consisted of ten trials conducted within one month. 51 % of hens demonstrated consistently one type of reaction in all 10 trials. Hens demonstrating prevalently A, B or C reaction were classified as "bold","indifferent" and "shy" respectively. There were 34, 16 and 17 % "bold" individuals among SS, RR and SR hens respectively, 49, 73 and 59 % "indifferent" and 17, 11 and 24 % "shy" individuals among SS, RR and SR hens respectively. The hens classified as "bold" tended to lay more eggs and those classified as "indifferent" laid less eggs (P=0.07). There were no signifficant differences in egg shell hardiness and egg weight depending on the behavioural category. From the SR hens which demonstrated more "shyness" less eggs (21 %) with irregular white streaks on shell were coll ected as compared to SS hens (48 %) and RR hens (47 %). This undesirable egg shell feature is presumably evoked when the egg is rolling upon the wire cage floor immediately after being laid and may be connected with the behaviour of hen. This problem is being investigated using a greater number of hens.

SOME CAUSES OF CROSS-SUCKLING IN PIGLETS GROUP-HOUSED WITH THEIR MOTHERS

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The technology of group housing system enables sows and piglets to behave more naturally than traditional restrictive systems. However, when sows with piglets are housed together, piglets will occasionally suckle alien mothers. The goal of this study was to investigate some of the causes of this behaviour. For this purpose, we analyzed the importance of several behavioral aspects of nursing for the occurrence of crosssuckling.

The observations were carried out in one group-housing stable. Five groups of 3 to 4 sows with their piglets were observed. The average litter size was 8-9 piglets, the age of the litters was from 20 to 30 days. We chose groups of sows with similar litter ages. We observed four nursings per sow. We recorded the starting time of each nursing, the number of own piglets present at the udder, the number of alien piglets at the udder, and whether the suckling was with or without milk ejection.

The proportion of own piglets which missed the own mother's nursing was positively correlated with litter size (Spearman rank correlation coefficient, rs=0.612, n=19, p=0.0094). The sow's litter size was not in significant correlation with the sum of alien piglets cross-suckling at her udder (rs=0.31, n=19, p=0.19). Piglets from large litters were more frequently present at the udder of alien sows (rs=0.465, n=19, p=0.048). Parity of the sow had no influence on the number of cross-sucklers at her ud der (rs=0.33, n=19, p=0.16). The occupancy of sow's teats by own piglets was in negative, but nonsignificant correlation with the sum of alien piglets suckling her teats (rs=-0.39, n=15, p=0.098). Out of the 174 piglets 58% sucked only the own mother, 31% sucked two or more sows. Only 8% of piglets sucked solely one alien mother. 3% of piglets did not suck any sow during the observations.

In conclusion, the results indicate that piglets from large litters are contributing most to the cross-suckling in a group housing system for lactating sows.

PROBLEMS OF SIGNIFICANCE OF BEHAVIOUR INDICATORS IN THE HABITUATION PROCESS OF PIGS (Sus scrofa f. domestica)

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The analysis of significance of behaviour indicators in the habituation process of pigs (Sus scrofa f. domestica) has pointed out several problems. These problems concern the quantitative representation and intensity of individual activities in the course of single uninterrupted or repeated habituation tests, used for the assessment of the CNS excitability level. As the most significant activities in a novel environment of an experimental chamber, in 30-minute habituation tests, have been shown the motor activity and vocal (acoustic) manifestations, which has been significantly proved in great number of experiments by determining the stability of these indicators. The other observed activities like sniffing, defecation, floor biting, orientation to the exit from the experimental chamber, as well as non-active states have seemingly not shown sufficiently significant correlation values, in view of determining the individual characteristics in the CNS excitability and in the speed of habituation. For these reasons they have not been paid any attention in the experiments. The evaluation of all the behaviour indicators observed in the exploration process has disclosed the existence of specific individual manifestations of excitability, or temperament. It has been found that the excitation level of the animal may be manifested in high

frequency of motor activity, vocal manifestations, sniffing, of elimination activities. Since it has been proved that individuals with higher frequency of snif fing and elimination have lower frequency of motor activity and vocal manifestations, their classification for the categories of high and low excitability just on the basis of occurrence and many experimental animals have thus not been objective as high excitable. Our results point out the existence of the so-called "extrovert" (motor activities and vocal manifestations) and "introvert" (sniffing and elimination) types of pigs. By our opinion, these specific problems should be paid special attenti on in the selection of animals.

EFFECTS OF DIFFERENT KEEPING TECHNOLOGIES ON THE BEHAVIOUR OF CHICKENS OF VARIOUS GENOTYPES

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Characteristics and time-distribution of eating-pluming and motional activity behaviour were observed in identical populations under three different keeping conditions, namely extensive, semi-intensive (approaching the natural mode of

living) and intensive ones.

It can be stated, that under keeping conditions, approaching the natural ones, the greater part of the population is spending time on nourishment acquisition before noon, under intensive keeping condition, however, the time, spent on eating is more uniformly distributed in the course of the day, till the feeling of fullness is attained.

As to pluming and motional activity, salient differences, owing to keeping conditions were not evident.

According to our observations, under keeping conditions, approaching the natural ones, it is advisable to administer the feed in the morning, when the stock is let out, since during the later sections of the day, animals are scratching about only and pick up their feeding stuffs from the environment.

In case of intensive keeping, placement of the feeders should be carefully considered, in order to make them easily and shortly available for the animals. It is recommended to assure - as far as possible - the opportunity to pluming and scratching about too.

MAINTENANCE AND FEEDING BEHAVIOUR OF THE DAIRY CALVES FED BY

NURSING COWS

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Aim of this study was to quantify changes of behaviour of the calves fed by nursing cows. Twelve calves were used in a 14-week experiment. Calves were fed by their own mothers starting at the day of birth until the beginning of the experiment. They were kept in a loose housing with straw bedding together with nursing cows. The number of calves for one cow was assessed on the basis of their milk efficiency. Each calf was to drink 5 kg of milk. Calves ate concentrate mixture and hay in free choice, but they could also eat feed from the cow manger. Ethological observations were carried out on 15th, 22nd, 36th, 56th and 80th days of age of the calves. The total length of lying time in a barn was steadily decreasing from the first to the fourth observation. Differences were significant. The length of standing time in a barn had been almost constant during the first three ethological observa- tions, and significantly increased during the fourth observation. Significant differences were found in a total length of eating the feeds. Eating of concentrate, bedding and bulk feeds from the manger of cows was longest during the last fifth observation after weaning. The most time when eating hay was

spent during the fourth observation at the age of 56 days. The highest length of sucking was at the age of 15 days (146 min) and it decreased to 75 and 70 min in the next observations. Before weaning at the age of 56 days the length of sucking time was slightly increased to 92 min. The highest length of time of drinking water was recorded during the second observation at the age of 22 days. The total length of rumination time was significantly increased from the third observation at the age of 36 days and the highest length was recorded at the age of 56 days. The highest total length of lying and the lowest total length of standing occured during the fifth observation at the age of 80 days.

EFFECT OF DIFFERENT DRINKING INTERVALS ON MAINTENANCE AND FEEDING BEHAVIOUR OF CALVES

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The aim of this study was to determine an optimum drinking interval. We used 24 holstein calves from 10 days of age. All animals were kept in loose housing pens with deep bedding. They were given 6 kg of milk replacer daily. The calves from the experimental groups received milk replacer from the computer-controlled drinking feeder (Ffrster Comp).

There were 4 h drinking intervals in the first group (six times a day) and 6 h intervals in the second group (four times a day). Twelve hour cycle was used. Significant differences were found in the length of lying while ruminating; however, this parameter was higher in the calves fed in 6 h intervals four times a day during all observations. This tendency was also proved when assessing the length of ruminating. The calves from the first group spent longer time eating the concentrate within the first 24 h period (1st day of experiment). On the tenth day this condition was balanced. During the last observation (twenty-second day of experiment) the calves from the second group that were given milk in 6 h intervals spent significantly more time eating than calves from the first group. The length of eating hay was in calves from the second group significantly higher. We found that the length of standing in the first group of calves that drank 6 times a day was longer than that of the second group that drank 4 times a day. The frequency of stays with drinking when the calves left the drinking box immediately were almost always significantly higher in the first group. The same tendency was in the frequency of drinking at the feeder when the calves waited subsequently. In comparing the groups with a different interval, the frequency of stay in a drinking box without getting the portion is an important index involving a possible disturbance of the calves and impairment of their welfare. In both groups, the lowest

levels were recorded within the first 24 h when the calves were diverted towards the drinking box. In the next periods the levels o f this index increased; however, in the calves with a 4 h interval the frequency was higher during all observations.